R.No. ....

Subject: Basic Mathematics	Course Code: MGT 313
Full Marks: 100	Time: 3:00 Hours

SECTION A: MULTIPLE CHOICE QUESTIONS (1 × 14 = 15 MARKS) / (TIME: 15 MINUTES)

Tick the best answers.

Q1. A set A = {x: x is even number, $0 < x \leq 10$} is:
   a. { 1,2,3,........9 }
   b. { 0,2,4,6,8,10 }
   c. {2,4,6,8,10 }
   d. { 0,1,2.........10 }

Q2. If n (U) = 500, n(A) = 150, n(B) = 100 and n(A∩B)=50. The value of exactly one is......
   a. 300
   b. 150
   c. 100
   d. 50.

Q3. Integer number is denoted by
   a. R
   b. Z
   c. W
   d. Q.

Q4. Quadratic function is ....
   a. $2x^2+5$
   b. X^3-x^2
   c. 6.
   d. 3x-5

Q5. Find the value of: $\left| -10 \right| - \left| 3 \right| - \left| 5 \right|$
   a. -18
   b. 2
   c. 18
   d. -2

Q6. The profit function is......
   a. R(x) – C(x)
   b. Price x quantity
   c. C(x) –R(x)
   d. None of these.

Q7. The right open interval of (a, b) is ....
   a. [a, b)
   b. (a, b)
   c. (a , b]
   d. [a,b]

Q8. The derivative of log x is.......
   a. x,
   b. x log a,
   c. logx,
   d. $\frac{1}{x}$.

Q9. Find the value of $\lim_{x \to 2} \frac{x^2-4}{x-2}$
   a. ∞,
   b. 1,
   c. 4,
   d. None of these.

Q10. The decreasing function is ....
   a. $x < y \Rightarrow f(x) > f(y)$,
   b. $x < y \Rightarrow f(x) < f(y)$,
   c. $x = y \Rightarrow f(x) > f(y)$,
   d. $x > y \Rightarrow f(x) < f(y)$,

Q11. The integration of $\int x^n\, dx$ is ....
   a. $\frac{x^{n+1}}{n+1} + c$,
   b. $\frac{x^{n-1}}{n-1} + c$,
   c. $nx^{n-1} + c$
   d. nx.

Q12. The integration of $\int_0^1 e^x dx$ is......
   a. 0,
   b. e,
   c. e-1
   d. 1.

Q13. If two rows or columns in a determinant are interchanged, the value of the determinant is.....
   a. Same sign,
   b. Zero,
   c. Identity.
   d. Opposite sign.

Q14. The determinant of $\begin{vmatrix} 3 & 3 \\ 3 & -3 \end{vmatrix}$ is ....
   a. 18
   b. -18
   c. 0
   d. 1.

Q15. The compound amount of half yearly is.....
   a. $P\left(1 + \frac{R}{100}\right)^{2T}$
   b. $P\left(1 + \frac{R}{100}\right)^{T}$
   c. $P\left(1 - \frac{R}{100}\right)^{2T}$
   d. $P\left(1 + \frac{R}{200}\right)^{2T}$

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You are required to answer in your own words as far as applicable. The figures in the margin indicate full marks.

SECTION B: SHORT ANSWER QUESTIONS (8 × 5 = 40 MARKS)

Answer any EIGHT questions:

Q1. If U = {1,2,3,4,5,6,7}, A = { 1,3,4,6} and B = { 2,3,5,7}. Verify that :$(A \cap B)^c = A^c \cup B^c$.

Q2. Define real number. Prove that $\sqrt{7}$ is an irrational number.

Q3. Show that $\frac{3a+2b}{a+b}$ is a rational number lying between 2 and 3 where a and b are rational number.

Q4. Evaluate: $\lim_{x \to 4} \frac{x^2-16}{\sqrt{3x+4}-4}$.

Q5. Find $\frac{dy}{dx}$.
   a) $y = (6x^2 - x + 7)^5$
   b) $y = (x^2 + 1)(x^4 + 2)$.

Q6. The demand function for a commodity is given by $P = 108 - 5Q$ and the cost function $C = -12Q + Q^2$. Find the marginal profit function when Q = 8.

Q7. If the marginal cost function for a product is MC = $10x^2+6x+4$ and the fixed cost is Rs. 100. Find the total cost and average cost function.

Q8. Define the determinant. Expand the following determinant and solve for x: $\begin{vmatrix} x & 3 & 3 \\ 3 & 3 & x \\ 2 & 3 & 3 \end{vmatrix} = 0$.

Q9. If $X + Y = \begin{bmatrix} 2 & 0 \\ 1 & -1 \end{bmatrix}$, $X-2Y = \begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix}$
   Find the value of X and Y.

Q10. Initial cost of a house was Rs. X , depreciates by 5% in 2 years and then by 10% in next year then its price becomes Rs. 32,49,000 at the end of 3 years. Find the value of X.

SECTION C: LONG ANSWER QUESTIONS (3 × 10 = 30 MARKS)

Answer any THREE questions:

Q11. Define cost function, revenue function and profit function. For the first year the fixed cost for setting up a new electronic pocket calculators company is Rs.600,000.The variable cost for producing a calculator is Rs.140. The company expects the revenue from the sale of the calculators to be Rs. 540 per calculator,
   i) Construct the cost function.
   ii) The profit function
   iii) Find the break-even point.
   iv) Find the number of calculators produced for which the company will suffer a loss.

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Q12. If the revenue function is R = $14x - x^2$ and the cost function C = x^3-2x.
   Find the value of maximum profit.

Q13. The price of commodities A, B, C is respectively, a, b, c rupees per unit. Mr. X purchases 4 units of c and sells 3 units of a and 5 units of b. Mr. Y purchases 3 units of b and sells 2 units of a and 1 units of c. Mr. Z purchases 1 units of a and sells 4 units of b and 6 units of c. In this process X and Z earn Rs. 6000 and 13000 respectively. While Y neither loss nor gain. Find the price per unit of the three commodities.

Q14. Define matrix and types with examples. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, prove that $A^2 - 5A + 6I = 0$.

Q15. a) Evaluate: $\int_0^1 (x^2 + 3x + 1)dx$.
   b) The rate of repair of a machine is given by $\frac{dc}{dt} = 5t + 12.5$ where t is the age of machine in years and $\frac{dc}{dt}$ is in Rs. per years. Find the total repair cost after 4 years.

SECTION D: CASE STUDY (15 MARKS)

Q16. *Read a case given below and answer the following questions:*
   A survey of 500 television viewers produced the following information: 285 watch channel A, 195 watch channel B, 115 watch channel C, 70 watch channel A and B, 50 watch channel B and C, 45 watch channel A and C. If 50 of the viewers watch none of the channels. Find how many of them watch.
   a. At least one of the channels
   b. All three channels
   c. Two channels only
   d. One channels only
   e. At most one channels.

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